CLAIMS

1. A method for estimating the velocity of a mobile radio, comprising the steps of:
   (a) receiving a radio signal at the mobile radio;
   (b) computing an autocorrelation and power of the received signal;
   (c) dividing the autocorrelation by the power of the received signal;
   (d) using a Bessel function lookup table to determine $f_d\tau$ where f_d is the Doppler frequency and τ is the lag associated with the correlation and using this information to estimate the velocity of the mobile radio.

2. A method for estimating the velocity of a mobile radio as defined in claim 1, wherein the autocorrelation is computed using a lag (τ) that is predetermined.

3. A method for estimating the velocity of a mobile radio as defined in claim 2, wherein the lag (τ) is stored within the mobile radio.

4. A method for estimating the velocity of a mobile radio as defined in claim 2, wherein the lag (τ) is chosen from the interval

$$0.0 \leq \tau \leq \frac{\lambda}{\pi \, v_{\max}}$$, where v_{max} is the maximum velocity of the mobile radio and λ is the wavelength of the received signal.

5. A method for estimating the velocity of a mobile radio as defined in claim 1, wherein steps (b)-(d) are performed using a Digital Signal Processor (DSP).

6. A method for estimating the velocity of a mobile radio as defined in claim 2, wherein only one a lag (τ) is used in estimating the velocity of the mobile radio.

7. A method for estimating the velocity of a mobile radio as defined in claim 1, wherein the mobile radio comprises a cellular telephone.

8. A method for estimating the velocity of a mobile radio as defined in claim 1, wherein the Bessel function lookup table comprises an inverse Bessel function table.

9. A method for estimating the velocity of a mobile radio as defined in claim 8, wherein the inverse Bessel function table is stored within the mobile radio.

10. A radio, comprising:

a receiver for receiving a radio signal; and

a velocity estimation block coupled to the receiver for estimating the velocity of the radio, the velocity estimation block including:

an autocorrelation block coupled to the receiver for determining the autocorrelation of the received signal using a predetermined lag;

a power block coupled to the receiver for determining the power of the received signal; and

a Bessel lookup table coupled to the autocorrelation and power blocks for estimating the velocity of the radio.

11. A radio as defined in claim 10, wherein the Bessel lookup table comprises an inverse Bessel lookup table.

12. A radio as defined in claim 11, wherein the autocorrelation determined by the autocorrelation block is divided by the power determined by the power block in order to determine the inverse Bessel function of $2\pi f_d \tau$, where f_d is the Doppler frequency caused by the movement of the radio and τ is the predetermined lag.

13. A radio as defined in claim 12, wherein the predetermined lag is stored in the radio.

14. A radio as defined in claim 13, wherein the inverse Bessel lookup table is stored in the radio.

15. A radio as defined in claim 14, comprises a cellular telephone.

16. A radio as defined in claim 1, wherein the velocity estimation block comprises a Digital Signal Processor performing velocity estimation calculations.

17. A radio as defined 1, wherein the lag (τ) is chosen from the interval

$$0.0 \leq \tau \leq \frac{\lambda}{\pi\ v_{\max}}$$, where v_{max} is the maximum velocity of the mobile radio and λ is the wavelength of the received signal.

18. A method for estimating the velocity of a radio communication device, comprising the steps of:

receiving a signal at the radio communication device;

computing the power of the received signal;

computing the autocorrelation of the received signal using a single lag associated with the correlation; and

using an inverse Bessel function table and the computed power and autocorrelation to provide an estimate of the velocity of the radio communication device.

19. A method as defined in claim 18, wherein the single lag and the inverse Bessel function table are stored in the radio communication device.

20. A method as defined in claim 19, wherein the method is performed using a controller that uses the equation:

$$v = \lambda \frac{InverseJ_0\left(\frac{E[r(t)r(t-\tau)]}{E[r(t)^2]}\right)}{2\pi\tau},$$

where,

$E[r(t)r(t-\tau)]$	Autocorrelation of the received signal,
τ	Lag associated with the correlation,
$E[r(t)^2]$	Signal power,
J_0	Bessel function of order 0,
v	Velocity of the radio communication device,
λ	Wavelength of the signal; and
Inverse $J_0()$	values found in the inverse Bessel function table.